

REMARKS

The Applicants sincerely appreciate the thorough examination of the present application as evidenced by the Office Action of June 24, 2005. In response, the Applicants have rewritten Claims 2, 12, and 14 in independent form; amended Claims 12 and 13 to more clearly define the claimed invention; canceled Claims 19 and 20; and added new dependent Claims 21-27. In the following remarks, the Applicants will show that all claims are patentable over the cited art. A Notice of Allowance is thus respectfully requested in due course. Moreover, the Applicants note that claims have been canceled and amended to advance prosecution of the present application without prejudice to the Applicants' right to pursue canceled and/or unamended claims in a continuing application.

All Requests Regarding The Information Disclosure Statements Have Been Complied With

The Office Action requests submission of an English translation of the complete Korean Publication No. 10-1992-0001543. In response, the Applicants submit herewith a complete English translation of Korean Publication No. 10-1992-0001543 (hereinafter "the English translation") together with a Statement Of Accuracy Of Translation.

Accordingly, the Applicants request that the Examiner provide indication of consideration of the English translation. For the Examiner's convenience, the Applicants further submit herewith a Form PTO-1449 citing the English translation for the Examiner to provide indication of consideration thereof. In the alternative, the Applicants respectfully request that the Examiner provide indication of consideration on a Form PTO-892.

As set forth in the Office Action, the fee and certification requirements of 37 CFR 1.97 are waived for the documents submitted in reply to the Office Action. Accordingly, no fee is believed due.

Applicants' Priority Claim Is Perfected

The Applicants are submitting herewith an English translation of Korean Application Serial No. 10-2002-0041952 to perfect the foreign priority claim of July 18, 2002. The Applicants are also submitting a Statement Of Accuracy Of A Translation in compliance with

37 CFR 1.52(d), 37 CFR 1.55(a) and 37 CFR 1.69. Accordingly, Japanese Publication No. 2003142234 (published May 16, 2003) is not prior art with respect to the present application.

Claim 2 Is Patentable Over Cook And Sandhu

Claim 2 has been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over U.S. Patent No. 6,352,594 to Cook *et al.* ("Cook") in view of U.S. Patent No. 6,499,425 to Sandhu *et al.* ("Sandhu"). The Applicants respectfully submit, however, that Claim 2 is patentable over the combination of Cook and Sandhu for at least the reasons discussed below.

Claim 2 has been rewritten in independent form (to include all recitations of Claim 1). As amended, Claim 2 recites a deposition system for depositing a layer on a substrate. More particularly, the deposition system includes:

- a process chamber;
- a susceptor in the process chamber, the susceptor being configured to receive a substrate for depositing a layer thereon;
- a showerhead on a side of the process chamber, the showerhead being configured to receive reaction gases and to introduce the reaction gases into the process chamber, the showerhead including a heating element therein for heating reaction gases prior to introducing the reaction gases into the reaction chamber, wherein the showerhead is further configured to spray the reaction gases into the process chamber in parallel with a substrate received on the susceptor.

(Underline added.)

The Office Action concedes that: "Cook *et al.* does not [teach] a coiled wire gas heater in the first plenum and connected to a terminal." Office Action, page 8. In support of the rejection, the Office Action states that:

Sandhu ... teaches a gas heater in a first plenum of a showerhead.

The motivation for adding the gas heater of Sandhu *et al.* to the apparatus of Cook *et al.* is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu *et al.*

Therefore it would have been obvious to one of ordinary skill in the art to add the gas heater of Sandhu *et al.* to the apparatus of Cook *et al.*

Office Action, page 8.

As set forth in the Manual Of Patent Examining Procedure (MPEP), three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference

teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *See*, MPEP, Sec. 2143.

The Applicants respectfully submit that there is no motivation to modify the apparatus of Cook to include the gas heater of Sandhu, and that Cook actually teaches away from such a modification. As discussed in portions of Cook cited in the Office Action:

FIG. 7 illustrates a gas injector 78 having a body 80.... Two gas fittings 84, 86 are shown, providing input for reactant gas to gas channels 88, 90. A water channel 92 is shown between the channels 88, 90 for passage of water to cool the injector 78. (Underline added.)

Cook, col. 4, lines 63-65. Cook teaches away from inclusion of heating element 222 coupled to a gas conduit from Sandhu because Cook discusses "passage of water to cool the injector 78."

Accordingly, the Applicants respectfully submit that the combination of Cook and Sandhu fails to teach or suggest the recitations of Claim 2 and that Claim 2 is thus patentable. In addition, dependent Claims 3-11 and 16-18 are patentable at least as per the patentability of Claim 2 from which they depend.

Claim 12 Is Patentable Over the Cited Art

Claim 12 has been rejected under 35 U.S.C. Sec. 102(e) as being anticipated by Sandhu. In addition, Claim 12 has been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over U.S. Patent No. 6,059,885 to Ohashi et al. ("Ohashi") in view of Sandhu. Claim 12 has also been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over Cook in view of Sandhu. The Applicants respectfully submit that Claim 12 is patentable over the cited art for at least the reasons discussed below.

As amended, Claim 12 recites a deposition system for depositing a layer on a substrate. More particularly, the deposition system includes:

- a process chamber;
- a susceptor in the process chamber, the susceptor being configured to receive a substrate for depositing a layer thereon;

a showerhead on a side of the process chamber, the showerhead being configured to receive reaction gases and to introduce the reaction gases into the process chamber, the showerhead including a heating element therein for heating reaction gases prior to introducing the reaction gases into the reaction chamber; wherein the showerhead comprises a plurality of plenums therein such that each plenum receives at least one respective reaction gas from a respective gas inlet port such that reaction gases from the plenums are introduced into the process chamber without prior mixing of the reaction gases between plenums within the showerhead wherein the plurality of plenums comprises respective base portions thereof having spray holes therethrough, wherein the respective base portions are co-planar, wherein the first plenum defines a first cavity providing fluid communication between a first gas inlet port and a first plurality of spray holes, wherein the second plenum defines a second cavity providing fluid communication between a second gas inlet port and a second plurality of spray holes, wherein the first and second cavities are separated, and wherein the first plenum has a length perpendicular to the co-planar base portions that is greater than a length of the second plenum perpendicular to the co-planar base portions.

The Applicants respectfully submit that the cited art fails to teach or suggest first and second plenums with co-planar base portions and different lengths perpendicular to the co-planar base portions as set forth in Claim 12.

With respect to Sandhu, to the extent that sub-conduits 228 and passageway 230 are interpreted as first and second plenums as set forth in the Office Action, these elements of Sandhu fail to teach or suggest first and second plenums defining respective first and second separated cavities. The passageway 230 and the sub-conduits 228 of Sandhu fails to teach or suggest separated cavities because the sub-conduits 228 are included in the passageway 230. *See*, Figures 9-12. Accordingly, Claim 12 is patentable over Sandhu.

With respect to the rejection based on Ohashi and Sandhu, the combination of Ohashi and Sandhu fails to teach or suggest the system of Claim 12. For example, Ohashi fails to teach or suggest first and second plenums comprising respective co-planar base portions and having different lengths perpendicular to the co-planar base portions. Sandhu fails to teach or suggest the system of Claim 12 for the reasons discussed above. Moreover, there is no motivation to somehow selectively combine aspects of the passageway 230 including the sub-conduits 228 therein of Sandhu with the separate space area S and space portion 719 of Ohashi. Accordingly, Claim 12 is patentable over the combination of Ohashi and Sandhu.

With respect to the rejection base on Cook and Sandhu, the combination of Cook and Sandhu fails to teach or suggest the system of Claim 12. For example, Cook fails to teach or

suggest first and second plenums having different lengths. Sandhu fails to teach or suggest the system of Claim 12 for the reasons discussed above. Moreover, there is no motivation to somehow selectively combine aspects of the CVD apparatus providing gas flow parallel with respect to processed wafers of Cook with the plasma processing apparatus providing gas flow perpendicular with respect to the processed wafers of Sandhu. Accordingly, Claim 12 is patentable over the combination of Cook and Sandhu. Accordingly, Claim 12 is patentable over the combination of Cook and Sandhu.

The Applicants thus submit that Claim 12 is patentable over the cited art for at least the reasons discussed above. In addition, dependent Claims 13 and 25-27 are patentable at least as per the patentability of Claim 12 from which they depend.

Claim 14 Is Patentable Over the Cited Art

Claim 14 has been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over U.S. Patent No. 6,059,885 to Ohashi et al. ("Ohashi") in view of Sandhu. Claim 14 has also been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over Cook, Sandhu, and U.S. Patent No. 5,958,140 to Arami et al. ("Arami"), and further in view of Ohashi. The Applicants respectfully submit that Claim 14 is patentable over the cited art for at least the reasons discussed below.

Claim 14 has been rewritten in independent form (to include all recitations of Claims 1, 12, and 13). As amended, Claim 14 recites a deposition system for depositing a layer on a substrate. More particularly, the deposition system includes:

- a process chamber;
- a susceptor in the process chamber, the susceptor being configured to receive a substrate for depositing a layer thereon; and
- a showerhead on a side of the process chamber, the showerhead being configured to receive reaction gases and to introduce the reaction gases into the process chamber, the showerhead including a heating element therein for heating reaction gases prior to introducing the reaction gases into the reaction chamber;
 - wherein the showerhead comprises a plurality of plenums therein such that each plenum receives at least one respective reaction gas such that reaction gases from the plenums are introduced into the process chamber without prior mixing of the reaction gases between plenums within the showerhead;
 - wherein a first of the plenums includes a heating element therein configured to heat gases passing through the first plenum and wherein a second of the plenums is free of a heating element;

wherein the first plenum includes an extended portion such that the first plenum extends further from the process chamber than the second plenum and wherein the heating element is located in the extended portion of the first plenum.

With respect to the rejection based on Ohashi and Sandhu, the Office Action states that Ohashi teaches:

a shower head having a first plenum S receiving a first gas, and a second plenum 719 receiving a second gas. The first plenum extends further from the process chamber than the second plenum. (Figure 7)

Office Action, page 6. Moreover, the Office Action concedes that Ohashi does not teach a gas heater in the first plenum. *See*, Office Action, page 6. In further support of the rejection, the Office Action states that:

Sandhu et al ... teaches a gas heater in a first plenum of a showerhead.

The motivation for adding the gas heater of Sandhu et al to the apparatus of Ohashi et al is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al.

Office Action, page 6.

Accepting the Examiner's characterizations of Ohashi and Sandhu for the sake of argument, nothing in either Ohashi or Sandhu teaches or suggests a heating element located in an extended portion of a plenum. Accordingly, the Applicants respectfully submit that Claim 14 is patentable over the combination of Ohashi and Sandhu. In addition, dependent Claim 15 is patentable at least as per the patentability of Claim 14 from which it depends. If any rejection of Claim 14 should be maintained based on the combination of Shashi and Sandhu, the Applicants respectfully request that the Examiner point out portions of Ohashi and/or Sandhu that teach or suggest a heating element located in an extended portion of a plenum.

With respect to the rejection based on Cook, Sahdhu, Arami, and Ohashi, the Office Action concedes that:

Cook et al, Sandhu et al, and Arami et al differ from the present invention in that they do not teach that the first plenum extends further from the processing chamber than the second plenum.

Office Action, page 11. In support of the rejection, the Office Action states that:

Ohashi et al was discussed above and includes a first plenum S extends further from the processing chamber than the second plenum 719.

The motivation for adding the motivation for elongating the first plenum in the apparatus of Cook et al, Sandhu et al, and Arami et al is to provide a specific shape for the plenums as taught by Ohashi et al. ...

Office Action, page 11.

Accepting the Examiner's characterizations of Cook, Sahdhu, Arami, and Ohashi for the sake of argument, nothing in any of the cited references (taken alone or in combination) teaches or suggests a heating element located in an extended portion of a plenum. Accordingly, the Applicants respectfully submit that Claim 14 is patentable over the combination of Cook, Sahdhu, Arami, and Ohashi. In addition, dependent Claim 15 is patentable at least as per the patentability of Claim 14 from which it depends. If any rejection of Claim 14 should be maintained based on the combination of Cook, Sahdhu, Arami, and Ohashi, the Applicants respectfully request that the Examiner point out portions of Cook, Sahdhu, Arami, and/or Ohashi that teach or suggest a heating element located in an extended portion of a plenum.


For at least the reasons discussed above, the Applicants respectfully submit that Claim 14 is patentable over the cited art. The Applicants further submit that dependent Claims 15 and 12-24 are patentable at least as per the patentability of Claim 14 from which they depend.

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CONCLUSION

Accordingly, the Applicants submit that all pending claims in the present application are in condition for allowance, and a Notice of Allowance is respectfully requested in due course. The Examiner is encouraged to contact the undersigned attorney by telephone should any additional issues need to be addressed.

Respectfully submitted,



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